

REMARKS

Claims 1-7 were previously canceled. By this amendment, claims 8, 14 and 19 have been amended to more particularly point out and distinctly claim the invention, and new claim 24 has been added. No new matter has been introduced. Accordingly, claims 8-24 are currently pending in this application. Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 8, 10-14, 16-19, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Budelman, U.S. Patent No. 6,244,331, in view of Hsieh, U.S. Patent No. 5,377,745.

Amended claim 8 recites an embedded centrifugal cooling device including a centrifugal fan and a heat sink. The centrifugal fan includes a rotary shaft and a plurality of blades. The heat sink includes a plurality of first cooling fins and a plurality of second cooling fins. An annular cavity is defined between the first cooling fins and the second cooling fins. The second cooling fins include a lower portion. The blades are located in the cavity, and the entire rotary shaft is located above the lower portion of the second cooling fins. Moreover, the rotary shaft is positioned away from the heat sink.

Amended claim 14 recites an embedded centrifugal cooling device including a heat sink, a cover, and a centrifugal fan. The heat sink includes a plurality of first cooling fins and a plurality of second cooling fins. A cavity is defined between the first cooling fins and the second cooling fins, and the second cooling fins include a lower portion. The cover is connected to the heat sink. The centrifugal fan includes a rotary shaft and a plurality of blades. The blades are located in the

cavity, and the rotary shaft is connected to the cover and is located above the lower portion of second cooling fins. The rotary shaft is positioned toward the cover to be away from the heat sink.

Amended claim 19 recites an embedded centrifugal cooling device including a heat sink, a centrifugal fan, and a cover. The heat sink includes a plurality of first cooling fins and a plurality of second cooling fins. A cavity is defined between the first cooling fins and the second cooling fins, and the second cooling fins include a lower portion. A centrifugal fan, having an axial direction and radial directions, includes a rotary shaft and a plurality of blades. The blades are located in the cavity, and the rotary shaft is located above the lower portion of the second cooling fins. The cover, including a plurality of inlets, is disposed on said heat sink and said centrifugal fan. Air from ambient is flowed in the axial direction of the centrifugal fan into the heat sink from the inlets of the cover, and is flowed in the radial directions of the centrifugal fan out of the heat sink. The rotary shaft is positioned away from the heat sink.

Specifically, in this application, since the rotary shaft 220 is positioned toward the cover 300 to be away from the heat sink 100, the motor for driving the rotary shaft 220 can be disposed on the cover 300 to be away from the heat sink 100. As a result, heat generated from the motor does not conduct to the heat sink 100, thus enhancing heat-dissipating efficiency of the heat sink 100.

In Budelman, the axle 532 extends toward the base 412, and the motor 524 is affixed to the base 412 of the thermal dissipation device 410. Thus, heat-dissipating efficiency of the thermal dissipation device 410 may be reduced due to heat generated from the motor 524. As a result, the temperature of the central region of the heat-generating device cannot be largely reduced.

Additionally, the outstanding Action states that "since the applicant has not pointed out the criticality of having a centrifugal fan over an axial fan, the type of fan used is simply a matter of design choice".

As shown in Fig. 1(b) of this application, the peak of the curve of temperature distribution mainly appears on the central region of the conventional axial fan. Then, the amplitude gradually decays along the direction toward the peripheral region. Unfortunately, due to the configuration of the conventional cooling device 10 with the axial-flow fan 50, the central region of the heat-generating device suffers the worst cooling effect compared to the peripheral region. Because the central region of the heat-generating device is positioned under the hub 53 of the axial-flow fan 50, the coolant air cannot be formed below the central region of the heat-generating device to dissipate heat.

In contrast, as shown in Fig. 3 of this application, the temperature distribution curve of the present invention with the centrifugal fan 200 is more planar compared to that of Fig. 1(b) since the coolant air generated by the centrifugal fan 200 can flow toward the central portion of the heat sink fins and then exhaust in the outer periphery of the cooling fins. Also, the centrifugal fan of the present invention can provide more air intake than that of the conventional axial-flow fan.

In addition, there is no motivation to combine Budelman and Hsieh. Budelman discloses a heat sink with an integrated blower. Hsieh discloses a cooling device with an axial fan. Each reference performs a substantially different cooling technique. The Examiner has not provided any suggestion or motivation to combine these references, and hence has not established a *prima facie* case of obviousness (MPEP 2143). There is no motivation to use Hsieh's axial fan in Budelman's thermal dissipation device, nor is there any motivation to modify Budelman's design based on

Hsieh. Applicants respectfully submit that this rejection is based on hindsight analysis of Applicants' claims, as opposed to being based on the teachings of the prior art.

As stated above, Applicants respectfully submit that claim 8 is patentable over Budelman in view of Hsieh. Since the citations do not disclose all the limitations of Claim 8, Claims 10-13 patently define over the cited art for at least the same reason. Similarly, the citations also do not teach or suggest the characteristics of claims 14 and 19, and claims 16-18 and 21-23 are also allowable.

Claims 9, 15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Budelman, in view of Miyahara, et al., U.S. Patent No. 5,940,268 (hereinafter "Miyahara").

Since Budelman does not disclose all the limitations of independent claims 8, 14 and 19, Applicants respectfully submit that Claims 9, 15 and 20, which depend respectively therefrom, are allowable over the cited references for at least the same reasons as set forth above.

Claims 9, 15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Budelman in view of Miyahara. Since Budelman does not disclose all the limitations of claims 8, 14 and 19, claims 9, 15 and 20 patently define over the cited art for at least the same reasons.

In the Drawings

In Figure 2(a), reference numeral "230" has been added to point to the rotary shaft of the centrifugal fan, and reference numeral "220" has been added to point to the blades of the centrifugal fan.

In Figure 3, reference numeral "110" has been added to point to the first cooling fins of the heat sink, reference numeral "120" has been added to point to the cavity of the heat sink, reference numeral "130" has been added to point to the second cooling fins of the heat sink, reference numeral "131" has been added to point to the lower portion of the first cooling fins, reference numeral "210" has been added to point to the rotary shaft of the centrifugal fan, reference numeral "220" has been added to point to the blades of the centrifugal fan, and reference numeral "300" has been added to point to the cover.

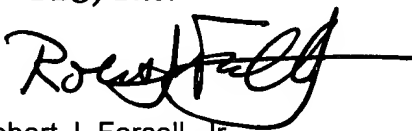
In view of the amendments to the specification and claims and the remarks set forth above distinguishing the claimed invention from the cited references, Applicants submit that the Examiner's rejections have been overcome. It is therefore respectfully requested that the Examiner withdraw the rejections and allow the present claims.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 50-2394.

Respectfully submitted,

IPS, Inc.

A handwritten signature in black ink, appearing to read "Robert J. Forsell, Jr.", with a long horizontal flourish extending to the right.

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